

ABSTRACT OF THE DISCLOSURE

A microfabricated device for electrokinetically moving biological and chemical samples includes a detection chamber for receiving a plurality of adjacent sample streams to be detected. The device includes a plurality of adjacent input channels fluidly connected to the detection chamber and each of the input channels is fluidly connected to the detection chamber via an enlarged end section. The enlarged end section may be an expanding taper having its widest end at the detection chamber. The taper may further be linear or parabolic shaped, or the taper may have other shapes. The novel enlarged end section provides for the plurality of adjacent sample streams to enter the detection chamber and remain substantially discrete for at least a threshold distance through the detection chamber. Accordingly, lateral diffusion of the samples is minimized. The microfabricated device may also feature a plurality of tapered junctions each of which is interposed between adjacent input channels. Channel supports may also be disposed in the detection chamber and opposite of the tapered junctions to further control flow of the samples. A method for multiplexed detection of samples in a microfluidic device comprises the steps of electrokinetically flowing at least two sample streams into a detection chamber wherein the at least two sample streams define a device plane. A light beam is directed through the detection chamber such that the light beam perpendicularly intersects the at least two sample streams and propagates in the device plane. The method may include flowing ancillary flows around the sample streams such that lateral dispersion is prevented. Systems and manifolds are provided which have improved detection chamber designs.